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ABSTRACT

Data for the Oregon Microcomputer Survey were collected in May 1989 via questionnaires for each of the department heads in a stratified random sample of 94 middle and high schools throughout Oregon. Designed to obtain information on the perceptions and reactions of the department heads to the status of microcomputers in their departments, the 52-item questionnaires were sent to the principals of the target schools for distribution to the departments of art/music, business education, English/language arts, foreign languages, health/physical education, mathematics, science, social studies, special education, and vocational education. The response rate was 59%. The questionnaires were divided into questions of a general nature, questions about teacher training, questions about computer hardware and software, and questions about computer use. Topics addressed by the survey included the issue of teacher training; hardware and software; instructional effectiveness; department heads' personal involvement; future of computers in instruction; current practices in classrooms; and top problems to solve. Forty-one tables and 29 graphs display the findings on such topics as formal teacher training; hours per week computers are used; student time on computers; computer literacy requirements for certification; repair of computers; advantages for students with special needs; effects of computer use; reasons programs are not being used; types of computers; who should get training; most important influence; unused programs; teacher and student complaints; and a prioritized list of top problems identified by the survey respondents. (ALF)

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Evaluating the Use of Microcomputers in Oregon Secondary Schools: The Perceptions of the Department Head

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The 1989 Statewide Survey
of the
Oregon Educational Computer Consortium
University of Oregon
and the
Oregon Department of Education

Oregon Department of Education
700 Pringle Parkway, SE
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Evaluating the Use of Microcomputers in Oregon Secondary Schools: The Perceptions of the Department Head

The 1989 Statewide Survey of the Oregon Educational Computer Consortium

conducted by

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College of Education
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Fall of 1991

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INTRODUCTION

Over the last five years there has been a lot of discussion and speculation about the role of computers in precollege education. Today, both hardware and software have become more powerful and meaningful in meeting the educational needs of both the faculty and the students at all levels of education. As a matter of fact, when one reads and studies the many publications on microcomputer technology and how to use it, as well as the current research or general articles on the instructional uses of the microcomputer in education, certain generalized assumptions and predictions seem to have come true.

In a nutshell these are:

1) The computer has proven to be a valuable and motivating device in instruction. Its significance and role has been felt in all aspects of secondary education.

2) While it is true that hardware and software have significantly diminished in cost, there is still a serious shortage of good quality and appropriate software to be used in the different subject areas taught in the secondary school.

. . . . there is still a serious shortage of good quality and appropriate software . . .

3) True integration of computers into the secondary curriculum is still in its infancy. However, if used effectively and under the appropriate circumstances, computers will surpass the potential of any other educational media which is used in the instructional process.

True integration of computers . . . is still in its infancy.

4) While secondary teachers have significantly increased their awareness and understanding of the potential of the computer in their field of expertise, nevertheless there is a serious need for better teacher training in this area. Preservice education of teachers should include the computer as an integral part of the secondary teacher-training program.

. . . . there is a serious need for better teacher training . . .

At the secondary school level, there is no question that the use of computer technology will increase dramatically during the 1990s! Today, any high school student who wants to have access to the major brands of computers can do so for word processing or to study almost any subject area offered in the high school curriculum. However, the responses provided by the different department heads in each of the participating schools show Oregon will continue to face a serious technological issue ..... that of what hardware and software to acquire for instructional consumption.

Therefore, it was the quest for answers to these and other issues, which formed the "moving force" for asking the different department heads to reveal their perceptions and reactions to the status of microcomputers in their departments.

As any survey requires appropriate funding, the collection of data was made possible through funds provided by the Oregon Department of Education and the Oregon Educational Computer Consortium (OECC). As in the two previous surveys, the entry of the data was done by graduate students enrolled in the Division of Teacher Education of the University of Oregon. The design of the questionnaire, the dissemination, the collecting and the analysis of the data was completed by the authors.

METHOD

The sample

The Oregon Microcomputer Survey was conducted during the month of May, 1989. The state of Oregon had 21 union high school districts and 156 unified school districts which operated 62 junior high schools, 34 junior/senior high schools and 185 high schools. In these schools, located in 36 counties, a total of 200,301 students were enrolled and taught by approximately 16,000 teachers. Of these students, approximately 131,328 students were enrolled in grades 9-12 and approximately 68,973 in grades 7-8.

. . . a stratified sample of 94 randomly selected schools . . .

Because the least enrollment was 19 students in a high school, 87 for the middle school, and a maximum of 1924 students in a high school, and 925 for a middle school, a stratified sample of 94 randomly selected schools, one third of the school population, was identified for the survey based upon school population. In other words, the sample for the survey was selected from a school population of which all schools were ranked according to the size of their student enrollment. If a school population was symbolized by "x," then,

a) a small school was one where $0 < x < 250$
b) a medium school was one where $251 < x < 900$
c) a large school was one where $x < 900$

In this ranking, the average school population was approximately 603 students! In the 94 selected schools, the stratification revealed the following distribution. If "x" was the school population, then "x" was such that for,

a) the small school, $0 < x < 350$

b) the medium school, $351 < x < 525$
c) the large school, $x > 525$
Here, the average school population was 461 students!

. . . the average school population was approximately 603 students!

As there were 62 junior high schools and 219 junior/senior high schools and high schools in the state of Oregon, representing 22% and 78% of the schools, respectively, the sample for the survey contained 21 junior high schools (i.e., 22%) and 73 junior/senior high schools and high schools (i.e., 78%). Among each of this group of schools an equal number of small, medium and large schools were represented (i.e. ,7 schools of each type). Although all these schools were selected at random, the size of their district, whether they were urban or rural and whether they had computers or not was also considered in the stratification process!

SOURCE OF SURVEY INFORMATION

During the month of February, the principal of each targeted school received a package which contained a questionnaire for each one of the department heads (i.e., English/Language Arts, Math, etc....). Each questionnaire contained 52 questions, each one of these displayed in a main category presenting either,

a) questions of a general nature,
b) questions about teacher training,
c) questions about computer hardware and software, or
c) questions about computer use.

RESPONSE RATE

As this document provides the FINDINGS only submitted by the **DEPARTMENT HEADS** of each of the targeted schools, the response rate reported here will only reflect that which relates to this document.

Therefore, as of May 15, 1989, the deadline by which all questionnaires had to be returned, as well as telephone follow-ups and sometimes personal visits had to be completed, **the response rate** by the **DEPARTMENT HEADS** was **59%** (i.e., 55 returns out of 94 mailings). Although more booklets were received after the deadline, the results presented and discussed here are only based on the data collected up to May 15, 1989.

THE RESULTS

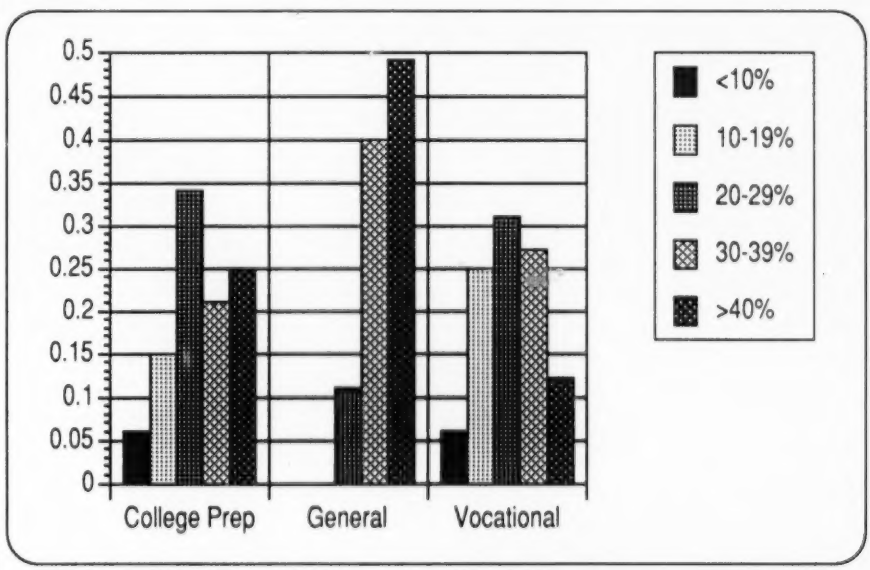
Because this survey was funded as a cooperative project of the Oregon Educational Computer Consortium, the University of Oregon and the Oregon Department of Education, the survey was designed to gather information on issues of concern to all three of these organizations. Therefore, in order for the reader to get a better perspective on the value and merit of the findings, a short discussion is presented on the type of student population which participated in this study.

Of note here is the fact that the total student population enrolled in the participating schools was 34,464 secondary and middle school students. The average full-time student enrollment in any one of the participating schools was 618 students, with a minimum enrollment of 69 students and a maximum enrollment of 1,403 students. In these schools, fifty-six (56%) percent of the students were children from factory or "other service" workers, with the remaining balance of the sample evenly divided between children from professional or office workers (22%) and farming families (22%).

. . . fifty-six (56%) percent of the students were children from factory or "other service" workers . . .

Furthermore, the percentage of students enrolled in a college preparatory, a general or a vocational curricula was as follows:

Graph #1 **STUDENT TRACKING**



. . . the percentage of students enrolled in a college preparatory, a general or a vocational curricula . .

Hence, of the 59 schools responding to the question of what percent of their school population was enrolled in what curricula, almost half of the schools stated that more than 40% of their student body was enrolled in a general curriculum.

What follows now is the summary of the findings provided by those questions which were deemed to be the most informative to both teachers, administrators and department heads of secondary schools. Because of the sampling procedures and the number of responses yielding the findings reported here, the results may be interpreted as coming from a representative sample of all secondary and middle schools in the state of Oregon.

. . . almost half of the schools stated that more than 40% of their student body was enrolled in a general curriculum.

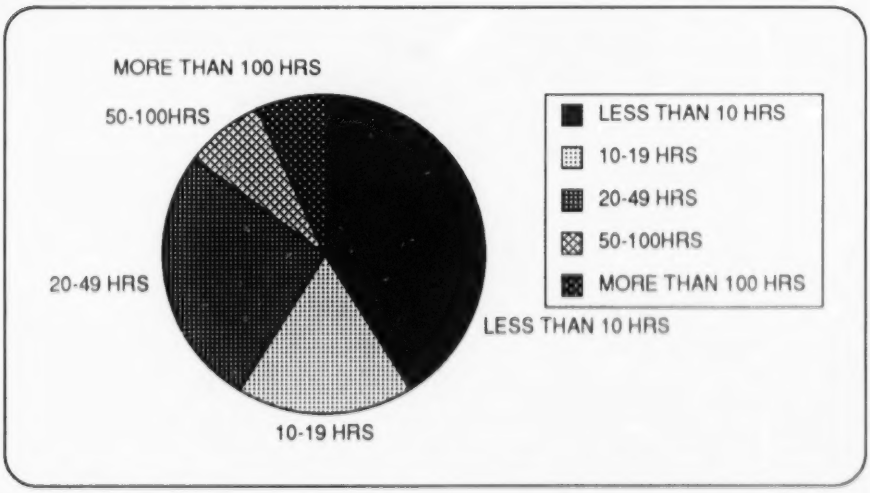
THE FINDINGS

First, it should be noted that the number of faculty members in the departments of the participating schools ranged from almost 7 members in the department of English and Language Arts, to 3 members in the department of Home Economics/ Business Education, with a 4.43 FTE as the average number of faculty in any department.

THE ISSUE OF TEACHER TRAINING

In order to get some idea of the degree of computer literacy each of these department heads possessed, participants were asked to identify on a given scale how many hours they had spent in the past three years in formal classes, training or workshops on computer-related topics. The table below summarizes their responses:

Graph #2 **FORMAL TEACHER TRAINING**



.. the majority of department heads had more than 10 hours of formal computer training.

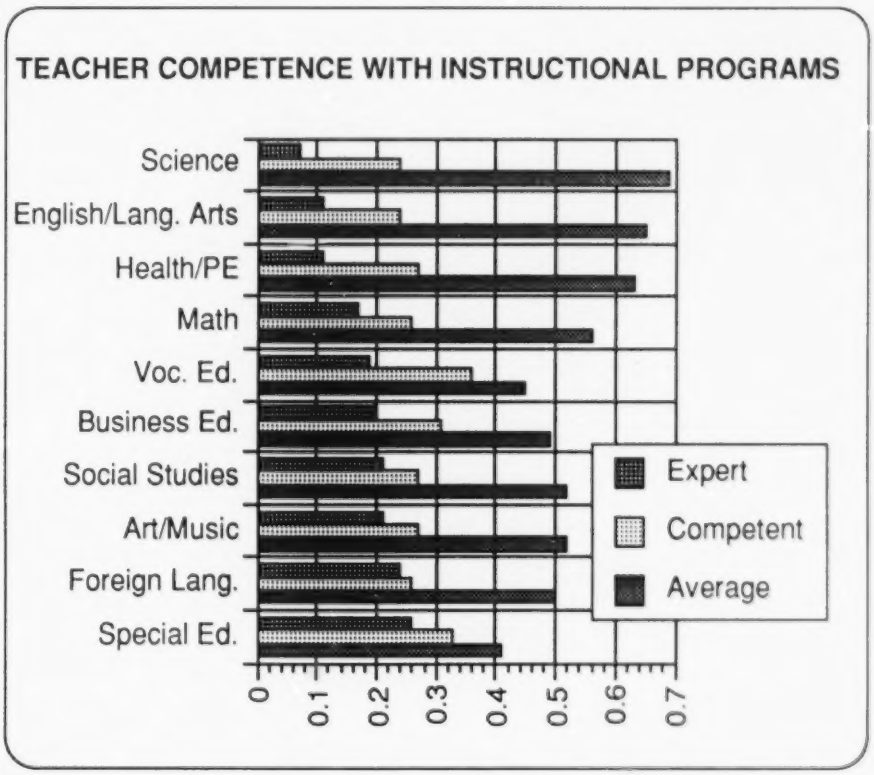
If one assumes that a two-day or an all-day workshop is about 12 hours and a 3-unit college course is about 45 hours,

then more than 85% of the department chairs had less than a 3-unit college course of computer-related training and even more than 50% had less than the equivalent of a one credit course.

. . . how many they felt were actually experts who could train other teachers.

As a follow-up question then, participants were given a specific set of computer generated activities and asked how many of their staff, including themselves, they perceived as competent in these activities, and in this group how many they felt were actually experts who could train other teachers. Therefore, looking at the task of using some instructional computer programs with at least one type of computer the following graph can be presented.

Graph #3



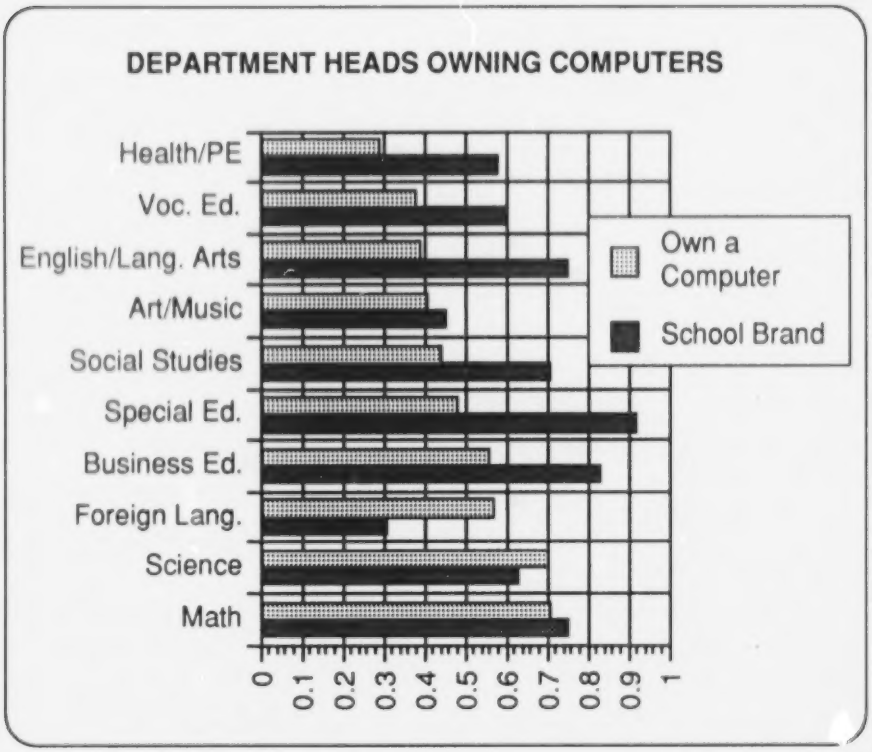
. . . majority of faculty in most departments feel they are at least competent in using instructional programs.

When asked whether the participants knew about a wide variety of instructional computer programs useful in teaching or about using word processing, recordkeeping, or similar professional tools or about writing useful programs in a computer programming language, an analysis of the data of those questions reveals that the majority of faculty in most departments feel they are at least competent in using instructional programs and that special educators seem to be the most competent in using useful instructional programs and to be able to train other teachers.

As a follow-up then to this question, participants were asked whether or not they owned a computer and if so, whether the computer was of the same brand as those used in their school. The resulting responses provided the following graph:

. . . they owned a computer and if so, whether the computer was of the same brand as those used in their school.

Graph #4



AVERAGE 49% have computers 65% same brand

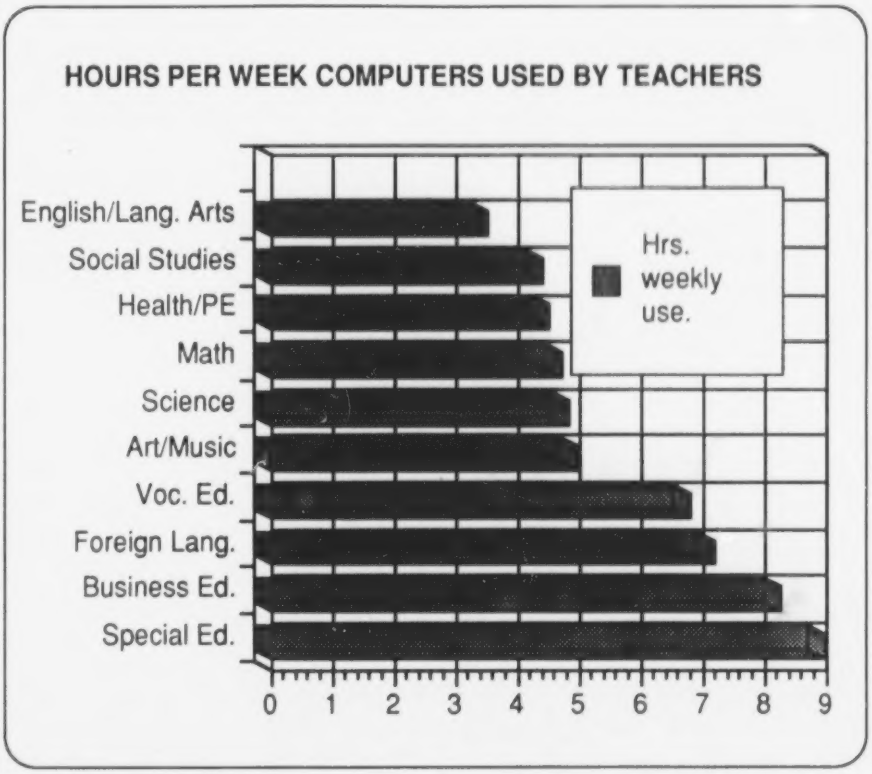
As can be noted from the above findings, more than 50% of the members of the departments of mathematics, science, business education and foreign languages have a home computer. While 48% of the number of faculty members in special education do own a computer, the majority of them have a computer of the same brand as those used in their school.

. . . more than 50% of the members of the departments of mathematics, science, business education and foreign languages have a home computer.

When asked how many hours per week they use the computer at home for any purpose, Graph 5 on the following page could be constructed.

Again, as can be noted, special education teachers seem to consume the most amount of weekly hours on their home computer.

Graph #5



Again, as can be noted, special education teachers seem to consume the most amount of weekly hours on their home computer.

OVERALL AVERAGE 5.82 hours/week

As most educators would agree, teacher training continues to be a major issue in the use of computers. Therefore, participants were asked, "If a choice had to be made between giving as many teachers as possible some training in computers versus a few teachers extensive training, which of these two choices would be the better choice?" The summary of their responses now follows:

. . . health, art/ music, and foreign language teachers were very strongly in favor of all teachers getting training . . .

Table #1

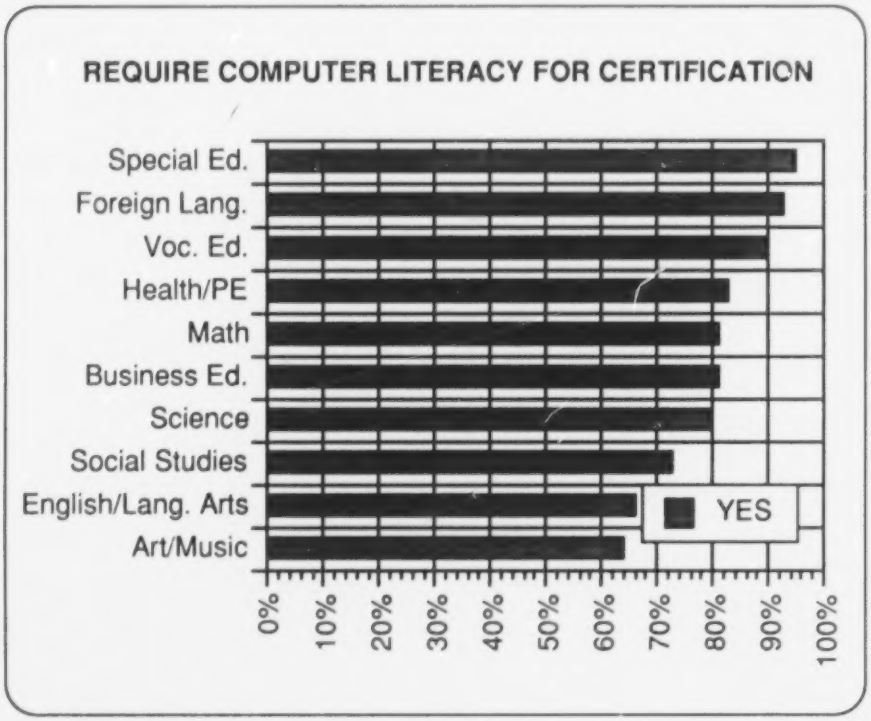
WHO SHOULD GET THE TRAINING?

a. Give many teachers some computer training	72%
b. Give a few teachers training	19%
c. Some other unspecified solution	9%

The health, art/music, and foreign language teachers were very strongly in favor of all teachers getting training but a third of the science teachers were in favor of concentrated training for just some of the teachers.

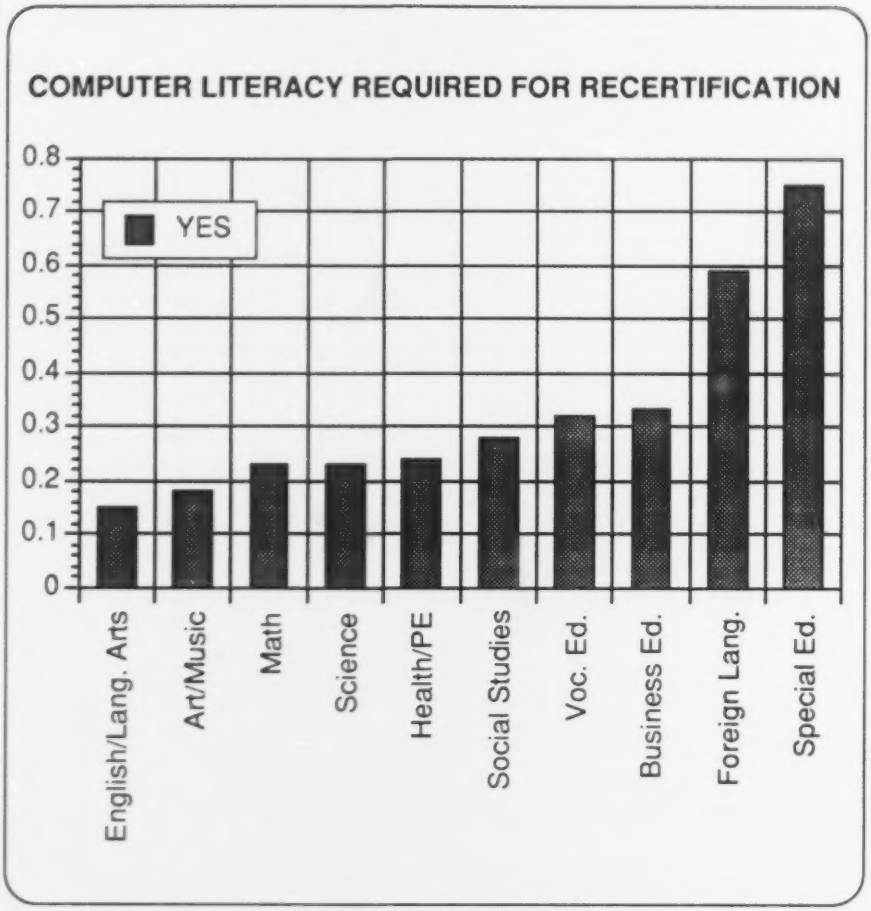
To conclude the questions related to teacher education, department heads were asked whether preservice teachers should be required to take computer-related skills training before graduation and whether or not computer-related competencies should be required before recertification in the state of Oregon. The responses by department are summarized in Graph 6 below.

Graph #6



. . . preservice teachers should be required to take computer related skills training before graduation . . .

Graph #7



. . . computer related competencies should be required before recertification . . .

. . . only one third endorse the idea that computer competencies should be required before recertification by current teachers.

While departments overwhelmingly believe that computer literacy and skills should be an integral part of any secondary school teacher training program, only one third of them do endorse the idea that these competencies should be required before recertification by current teachers.

HARDWARE

Each department head was asked to state the number and the type of computers he/she had in his/her department. Hence what follows is the summary of their responses:

Table #2

TYPE OF COMPUTERS	Average # Per Dept.
APPLE II	11
MACINTOSH	2
IBM	3
COMMODORE	2
OTHER COMPUTERS	3

In order to get some insight as to the growth in computer acquisition, participants were asked how many computers they had for each of the last three years, starting with 1987. Their responses can be summarized as follows:

Table #3

INCREASE IN NUMBER OF COMPUTERS

	# As of Jan. 1987	# As of Jan. 1988	# As of Jan. 1989
Business Ed.	16	19	20
Math	7	8	10
Voc. Ed.	6	7	9
English/Lang. Arts	3	5	4
Special Ed.	2	3	3
Science	1	2	2
Foreign Lang.	1	1	2
Art/Music	1	1	1
Social Studies	1	1	1
Health/PE	0	1	0
AVERAGE	4	5	5
INCREASE		26%	8%

. . . how many computers they had for each of the last three years . .

From the findings above it can be stated that most departments acquired one computer a year, while the Health/PE, Art/Music and Social Studies saw little gain in their computer acquisitions.

As a follow-up to this question, participants were asked to identify any peripheral hardware as well as that special computer-connected equipment for physically handicapped students. Their responses to that question is displayed in Table 4 on the next page.

Table #4

DEPARTMENTS WITH THESE PERIPHERALS

No Peripherals	46%
Dot Matrix Printers	48%
Letter Quality Printers	27%
Hard Disk Drives	26%
Joysticks or Paddles	25%
Graphics Pads/Tablets	17%
Plotters	15%
Laser Printers	15%
Other Peripherals	15%
Modems	14%
Voice-Synthesizers	13%
Optical Scanners	13%
Midi Interfaces	13%
Bar Code Readers	11%
CD Roms	11%

As can be noted from the findings above, 46% of the participants as of the date of the completion of the survey, had still no peripherals in their department.

. . . 46% of the participants had no peripherals in their department.

Department heads were asked who in their school had the most important role or influence in their most recent acquisition of hardware. Here is the summary of their responses:

Table #5

MOST IMPORTANT INFLUENCE

A single teacher, dept. head, or computer coordinator	50%
The school principal	22%
A group of teachers/other staff members	12%
The school district	7%
Other administrators	3%
ESD/County unit	2%
Other	5%

. . . the computer coordinators ... stated that the principals were the most influential.

When the computer coordinators were asked this question they stated that the principals were the most influential.

As networking is viewed as an important technological asset, participants were asked if they used any networking in

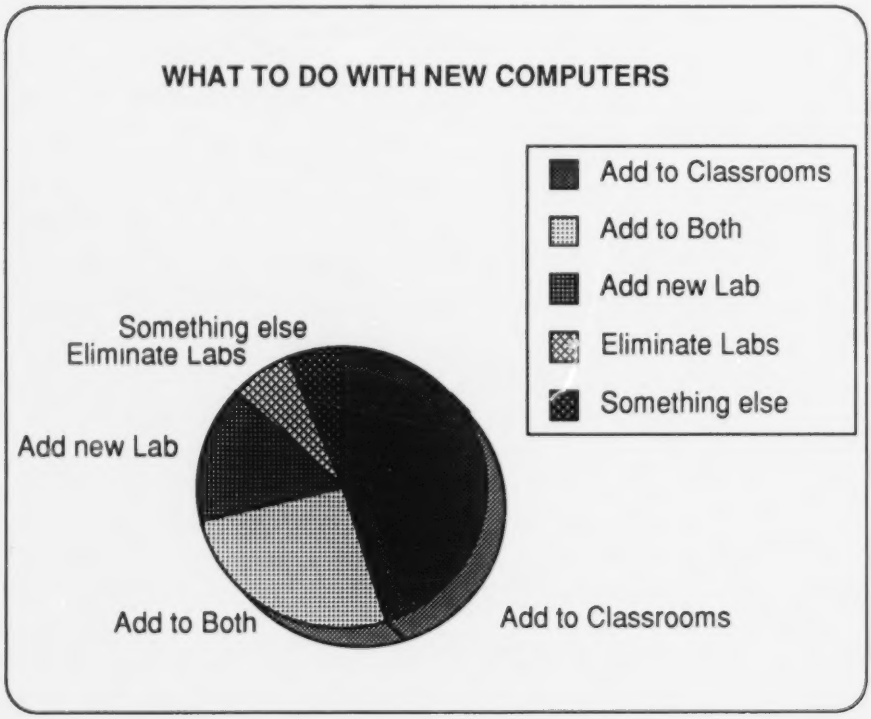
any of their classes. Overall, only 3% of all computers are in a network. It is interesting to note that really only four departments (business education, vocational education, English/language arts and mathematics) seem to had significant networking taking place in their classroom or laboratories. The other areas had no networking.

The other areas had no networking.

Department heads were asked how they would distribute additional microcomputers if their school had twice as many microcomputers. Their responses are summarized in Table 8 which follows.

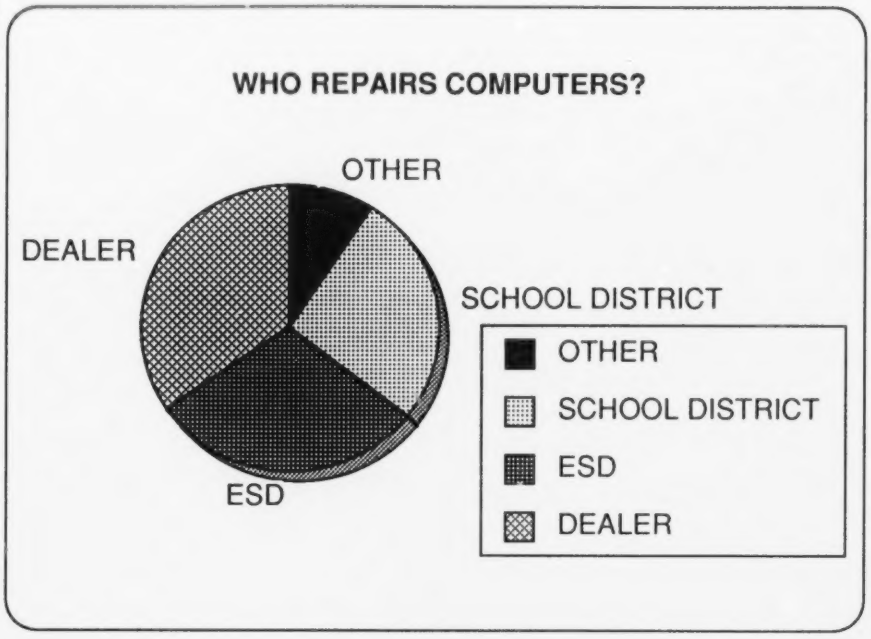
While eight departments were evenly divided between strengthening the number of computers in classrooms and laboratories, the departments of language arts and health, on the other hand, strongly endorsed the idea to put their additional computers in the classroom only.

Graph #8



Finally to conclude the questions related to the issue surrounding hardware, participants were asked who repaired their computers. Graph 9 on the next page gives a summary of where departments had their equipment repaired.

Graph #9



SOFTWARE SECTION

Because different departments use different kinds of software, this survey attempted to find out how many teachers and others on the professional staff regularly used certain kinds of programs. Furthermore, this survey wanted to find out when such programs were given to students, how the student/computer interaction was being managed.

Department heads were asked to check specific categories reflecting the possible number of staff members regularly using these programs. The summary of their "overall" and "by department" responses can be seen in the chart below:

Percent of Teachers Having Accomplished These Tasks	**Overall**
(a) Tried out an instructional program that might be used by students	77%
(b) Written a memo, letter, or report using a word-processing program	79%
(c) Retrieved administrative information directly from a computer	52%
(d) Written a computer program in Basic or another computer language	46%

Table #6

TASK	a	b	c	d
Art/Music	23%	62%	67%	26%
Business Ed/Home Ec	92%	95%	95%	92%
English Language Arts	54%	82%	82%	33%
Foreign Language	32%	77%	79%	26%
Health/PE	36%	64%	67%	21%
Mathematics	100%	95%	47%	93%
Science	50%	95%	90%	59%
Social Studies	30%	56%	51%	19%
Special Education	44%	83%	95%	22%
Vocational Ed	57%	86%	95%	68%
AVERAGES	77%	79%	52%	46%

Much of the software being used in the Oregon secondary school is of the MECC variety (i.e., 81%). To give the reader a better idea of the popularity of MECC software in the participating schools, a table was made to show the distribution by department.

. . . the popularity of MECC software in the participating schools . . .

Table #7

Department	Percent of MECC
Art/Music	64%
Business Ed/Home Ec	81%
English Language Arts	66%
Foreign Language	93%
Health/PE	83%
Mathematics	81%
Science	80%
Social Studies	73%
Special Education	95%
Vocational Ed	90%
AVERAGE	81%

When asked whether or not their school district had a written disk copying copyright policy and if such a policy was in effect whether or not it followed the ICCE guidelines, the department heads produced the responses on the following page.

. . whether or not their school district had a written disk copying copyright policy . . . .

Table #8

DISTRICT HAVE COPYRIGHT GUIDELINES

	Have	Follow ISTE (ICCE)
Art/Music	26%	40%
Business Ed/Home Ec	61%	27%
English Language Arts	26%	60%
Foreign Language	23%	44%
Health/PE	15%	50%
Mathematics	45%	3%
Science	N/A	N/A
Social Studies	47%	45%
Special Education	54%	36%
Vocational Ed	59%	45%
AVERAGE	40%	39%

. . . it did not establish if they thought that their district had an unwritten policy.

It should be noted that the question assumed that the department heads would know if their district had such a policy but it did not establish if they thought that their district had an unwritten policy.

. . . a fair price would be to charge a school for ten copies of a program that costs $50 for a single copy.

While software companies usually charge a school the same amount for each copy of a program that it buys, they also sometimes offer discounts for multiple purchases. Therefore, department heads were asked what a fair price would be to charge a school for ten copies of a program that costs $50 for a single copy. While the range of responses went from $130 to $400, the average response, however, was about $191.

Often schools have software that they are not using. Therefore, the participants were asked to give some approximation as to how many different commercially sold computer programs they had acquired at their school, but were not being used and what the major reasons were. Their responses now follow.

Table #9

Department	Unused Programs
Art/Music	3
Business Ed/Home Ec	7
English Language Arts	5
Foreign Language	11
Health/PE	9
Mathematics	7
Science	8
Social Studies	5
Special Education	9
Vocational Ed	4
AVERAGE :	7 programs

. . . how many different commercially sold computer programs they had acquired at their school, but were not being used . . .

The reasons for which these programs were not being used were identified through five categories of possible reasons. The graph below displays the responses to these choices.

Graph #10

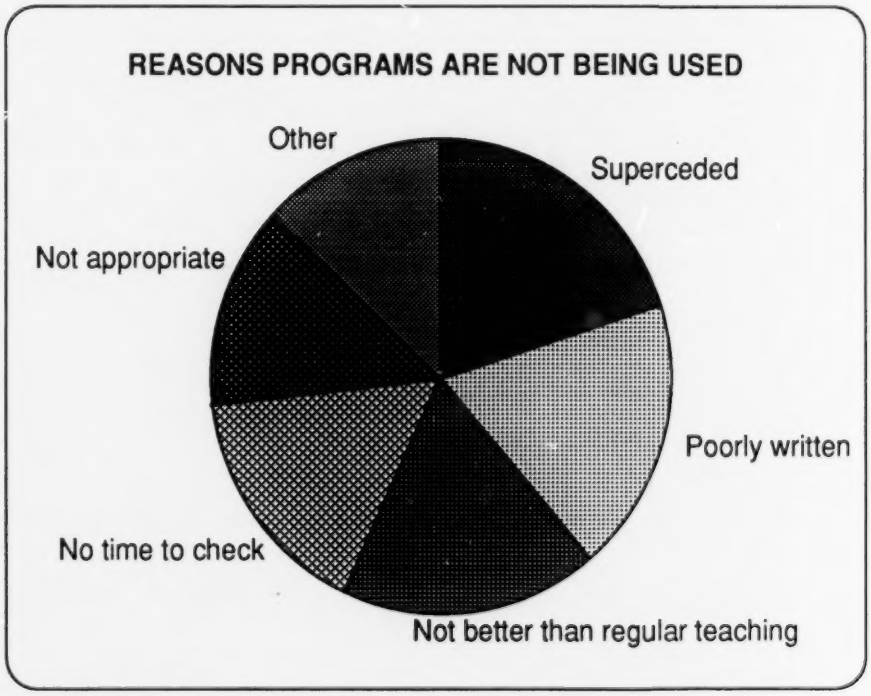


Table #10

REASONS PROGRAMS ARE NOT BEING USED

	Percentages
Has been superseded by better products	20%
Poorly written	19%
Not better than other methods	18%
No time to investigate usefulness	16%
Not OK in a classroom or school	14%
Other reasons	13%

Computer Use and Instructional Effectiveness

One of the critical issues which plagues any school administrator or teacher today relates to the issue of educational effectiveness of the computer. Therefore, in order to get some insight into the way the use of computers has or is affecting instruction, department heads were asked to give their perspective on a variety of questions related to this concern.

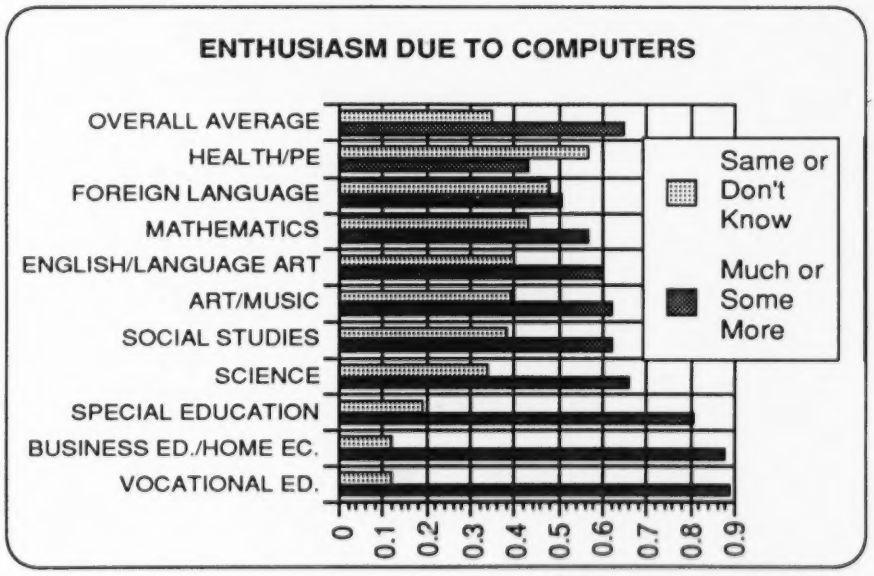
. . . insight into the way the use of computers has or is affecting instruction . . .

As a beginning question, the participants were presented with 10 different items, each reflecting a possible effect of computer use, and asked to respond to a semantic differential scale reflecting a positive or a negative effect of such use. Below follows the summary of their responses by item.

As a result of using computers at the school:

a) Enthusiasm for school in general is better.

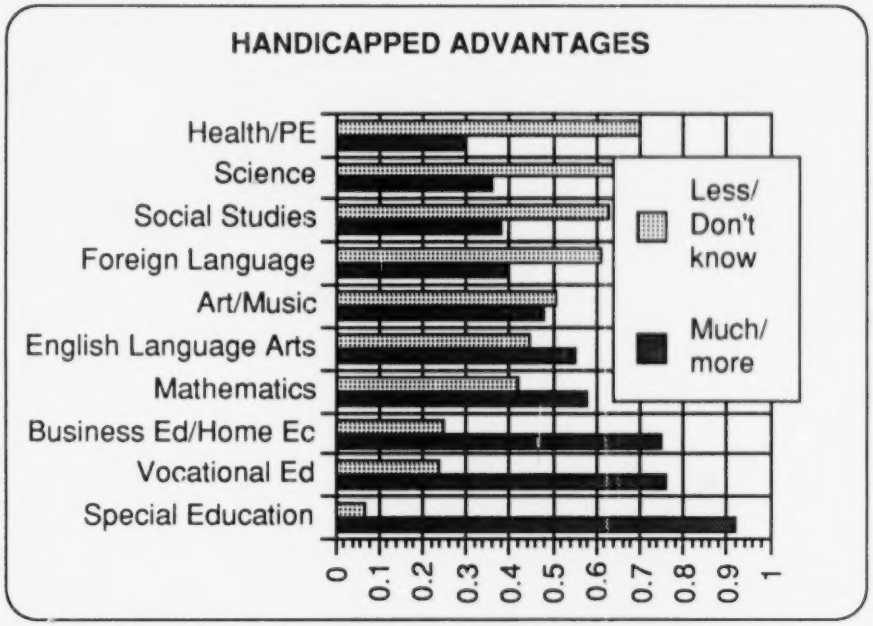
Graph #11



As a result of using computers at the school:

b) Special opportunities for students with learning disabilities or handicaps is . . . .

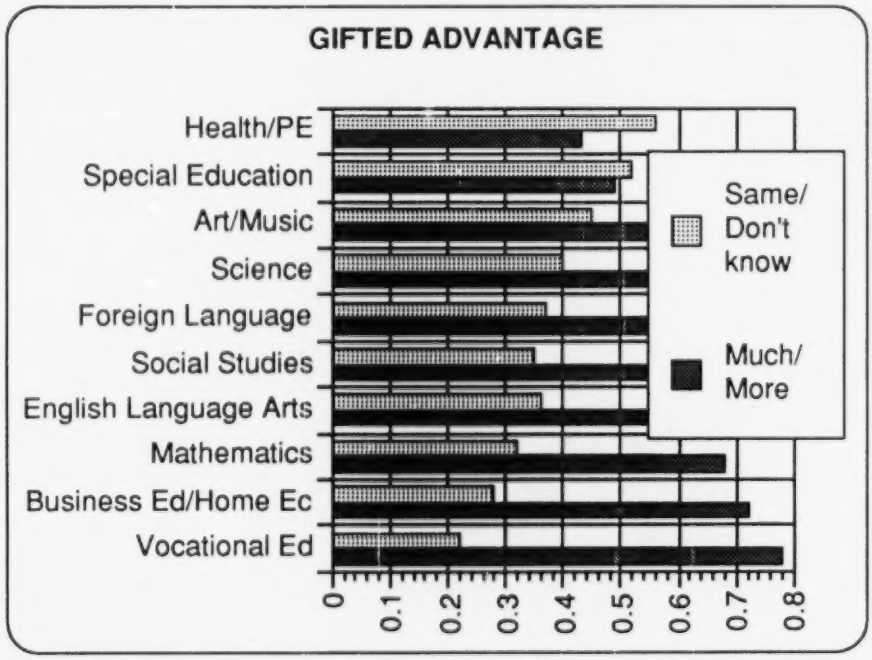
Graph #12



As a result of using computers at the school:

c) Special opportunities for the academically gifted is .

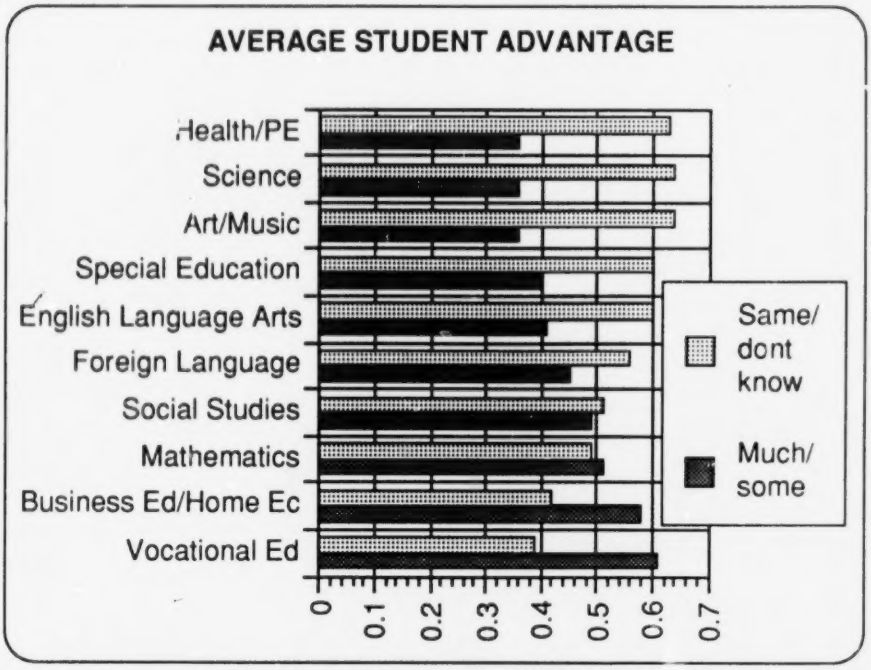
Graph #13



As a result of using computers at the school:

e) Learning in regular school subjects by average students is . . .

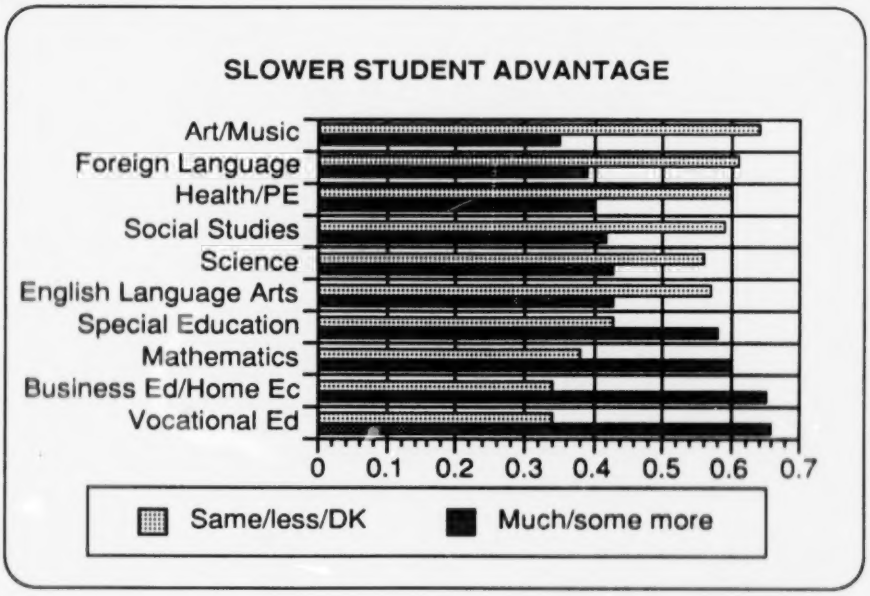
Graph #14



As a result of using computers at the school:

f) Learning in regular school subjects by below-average students is . . .

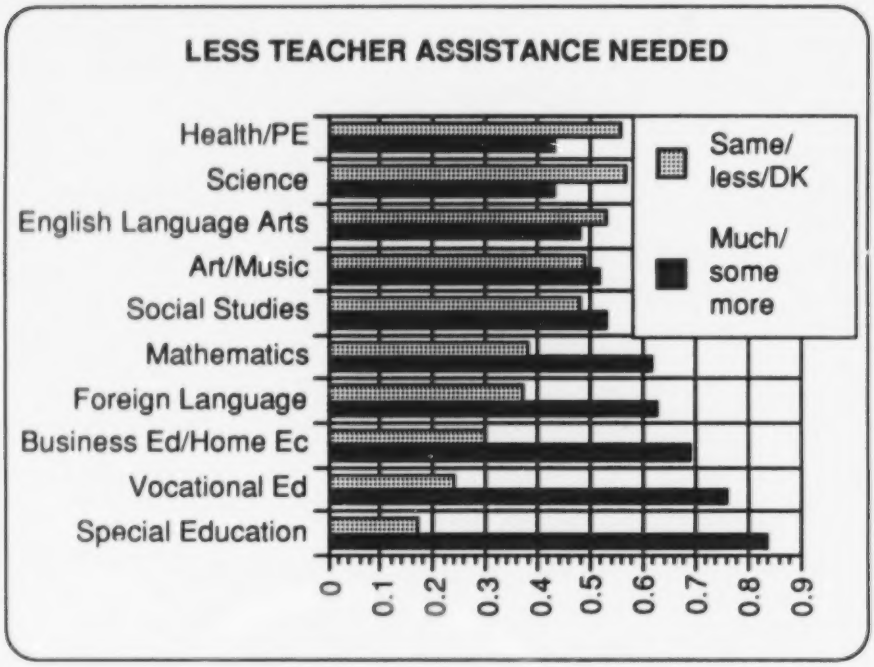
Graph #15



As a result of using computers at the school:

g) Students work successfully on their own without direct supervision from the teacher are . . .

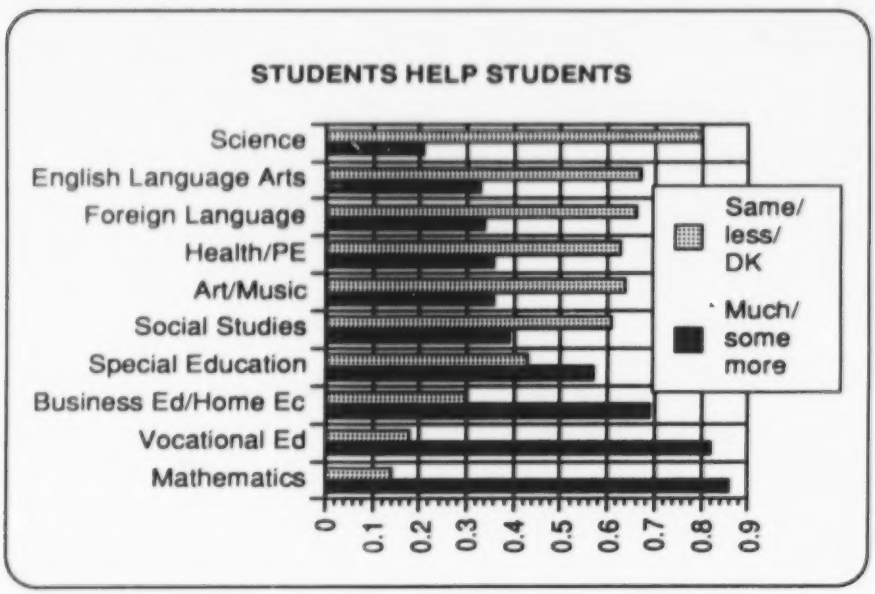
Graph #16



As a result of using computers at the school:

h) Students taking the lead in helping other students with their questions are . . .

Graph #17



. . . . the majority of the department heads felt that the instructional related variables as identified in the questions, had improved as a result of computer use.

From the findings presented in the graphs before, it can easily be stated that on the overall, the majority of the department heads felt that the instructional related variables as identified in the questions, had improved as a result of computer use.

"Diagnosis of student's learning problems and misunderstandings" clearly showed that teachers do not see that computers help them analyze and diagnose learning problems and misunderstandings in their teaching.

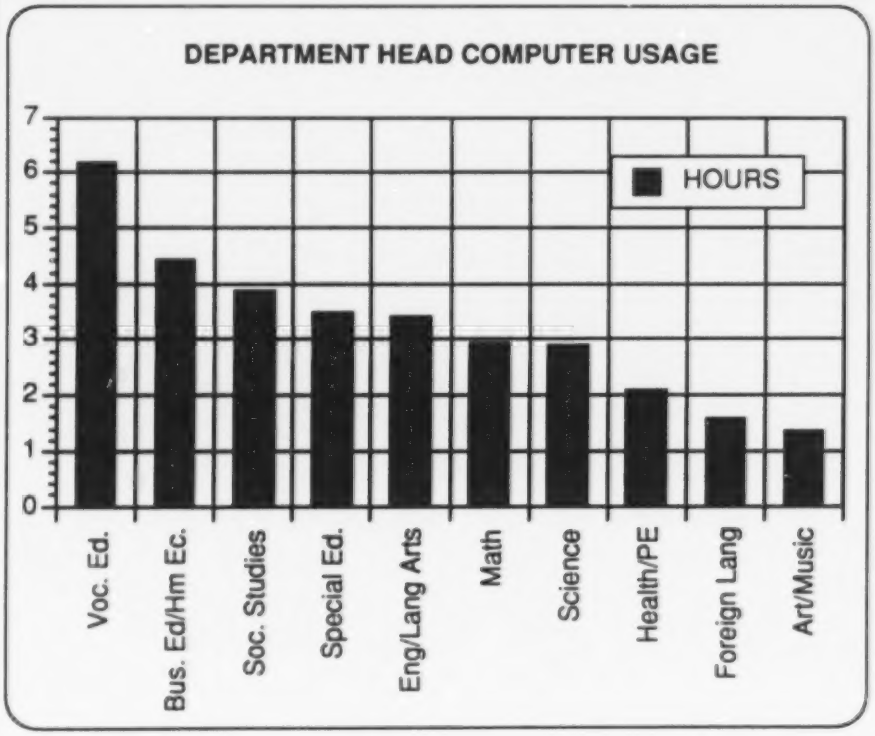
The information gathered from part j, "Diagnosis of student's learning problems and misunderstandings", although not graphed, clearly showed that teachers do not see that computers help them analyze and diagnose learning problems and misunderstandings in their teaching. This is interesting information if not surprising since computers are noted for assisting in analysis and diagnosis of problems in many other professions. Why in education do computers not improve analysis?

Department Heads Personal Involvement

. . . how many hours per week they personally used a school-owned computer.

In order to get some feelings with respect to the department heads own involvement with computer usage, they were asked how many hours per week they personally used a school-owned computer. Their responses are summarized in the graph which follows:

Graph #18



OVERALL AVERAGE 3.2

As a follow-up to this question, participants were asked how frequently they used the computer to do the type of activities as identified in the question which followed. The table and discussion below reflects the summary of their responses.

. . . how frequently they used the computer . . .

Table #11

Use a word-processing or other program for preparing student tests or assignments . . .

	Never	Monthly	Weekly	Daily
Science	19%	10%	26%	45%
Vocational Ed.	29%	17%	31%	23%
Social Studies	43%	13%	25%	20%
English/Lang. Arts	35%	15%	33%	17%
Math	18%	38%	28%	16%
Bus. Ed/Home Ec.	19%	14%	57%	11%
Art/Music	52%	21%	18%	9%
Special Ed.	56%	23%	16%	5%
Health/PE	50%	19%	28%	3%
Foreign Lang.	56%	16%	25%	3%
OVERALL AVERAGE	38%	19%	29%	15%

Graph #19

b) Use a word-processing program . . .

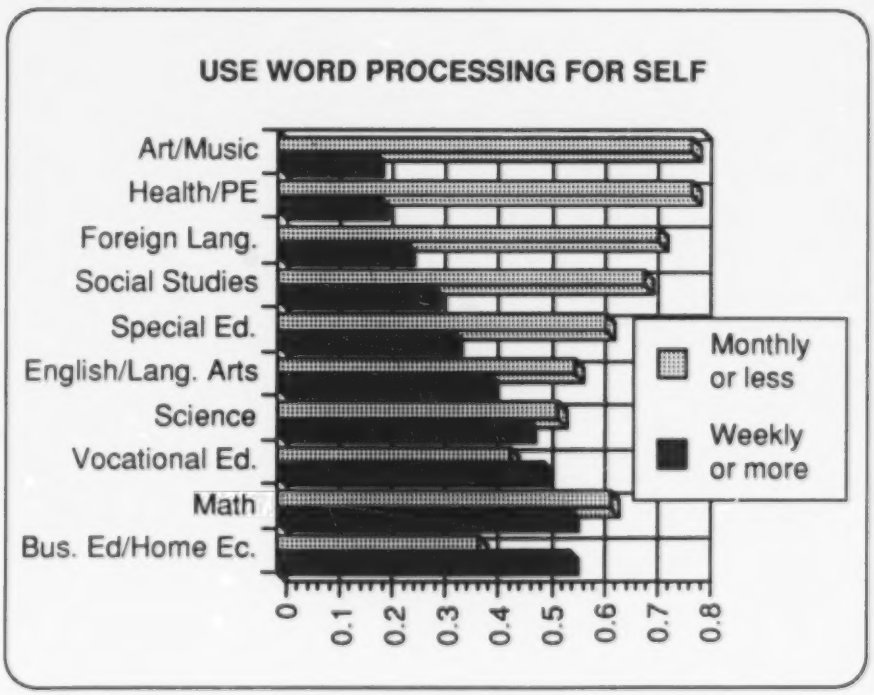


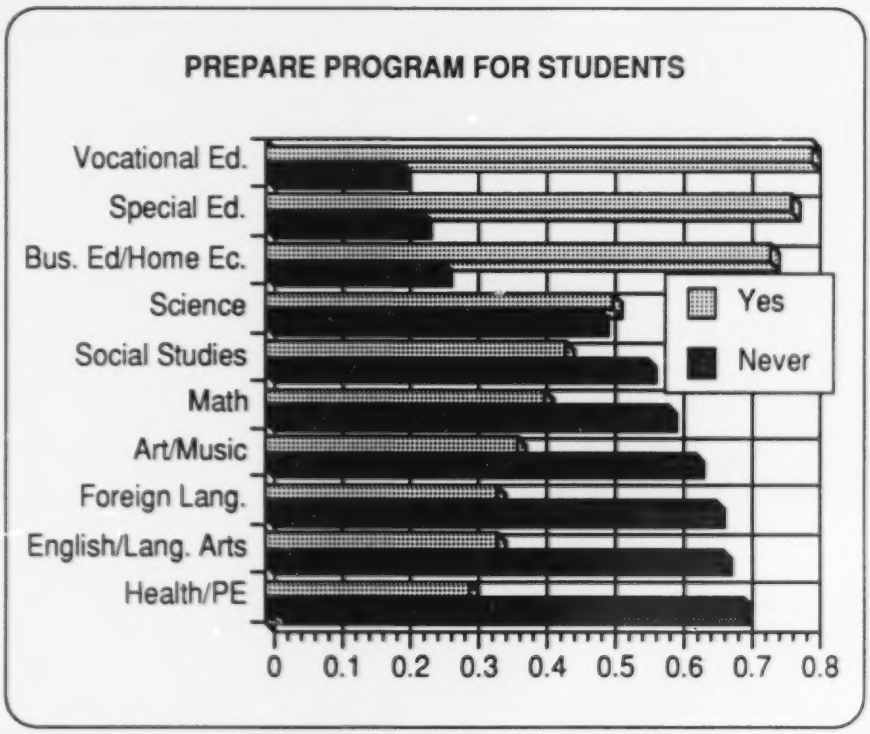
TABLE #12

c) Use a program for entering or calculating grades . . .

Never	Monthly	Weekly	Daily
60%	12%	18%	11%

d) Try out a program in preparation for students using it . . .

Graph #20



The above findings were actually derived from more specific questions asking whether the teachers were using the computers daily, weekly, monthly, or never.

As for trying out computer programs for students to use, 50% of the teachers have never done it.

The above findings were actually derived from more specific questions asking whether the teachers were using the computers daily, weekly, monthly, or never. It was found that on the overall, more than half of the department heads do use the computer to perform some administrative tasks, with more than 60% doing some type of word processing tasks. However, regular users are the ones using the computers at least weekly. It is a surprise that more than 60% of Oregon teachers do not use an electronic grade book. As for trying out computer programs for students to use, 50% of the teachers have never done it.

Looking now at the possible educational advantages of the computer for the students, participants were given seven different advantages and asked to select the three most important ones. What follows now is the summary of their selections.

Table #13

DEPARTMENT HEAD FEELINGS ABOUT THE COMPUTER BEING A SIGNIFICANT ADVANTAGE

	YES
Students get immediate feedback about whether they are right or wrong	29%
It makes learning more enjoyable	24%
Computer-based instruction can be varied for each individual student	17%
They learn about things they otherwise would not be exposed to	14%
The computer is a challenging focus for the faster-learning student	12%
Slower-learning students can progress faster than they would otherwise	11%
Students learn things more quickly	5%

Less than a third of the department heads feel that in any one area the computer has significant advantages for students.

Less than a third of the department heads feel that in any one area the computer has significant advantages for students. The areas where department heads see the most significant advantages are that it gives immediate feedback and it makes learning more enjoyable.

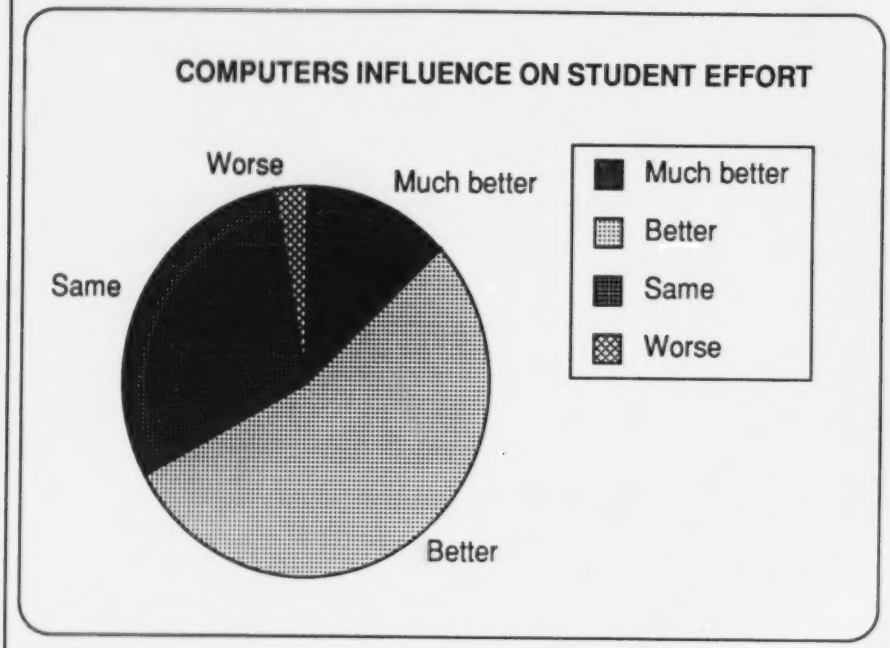
. . . where department heads see the most significant advantages are that it gives immediate feedback and it makes learning more enjoyable.

As a follow-up then to this question, participants were asked to compare the effectiveness of computer programs to other methods of teaching skills or concepts. The table below reflects the summary of their responses to a given set of classical concerns.

Computers, compared to other teaching methods influence . . .

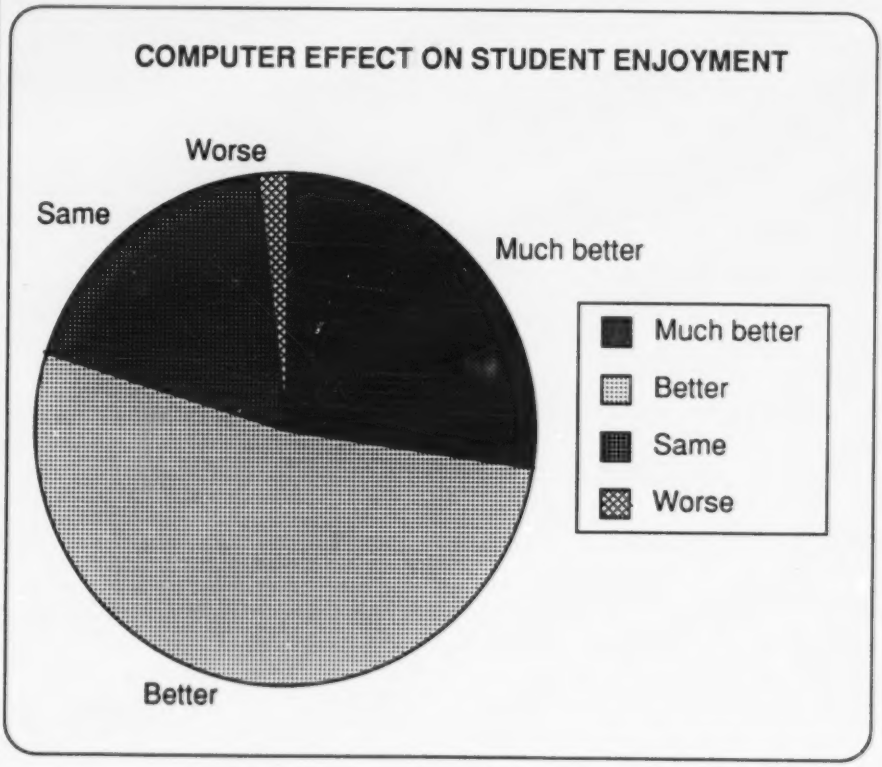
a) Student effort

Graph 21



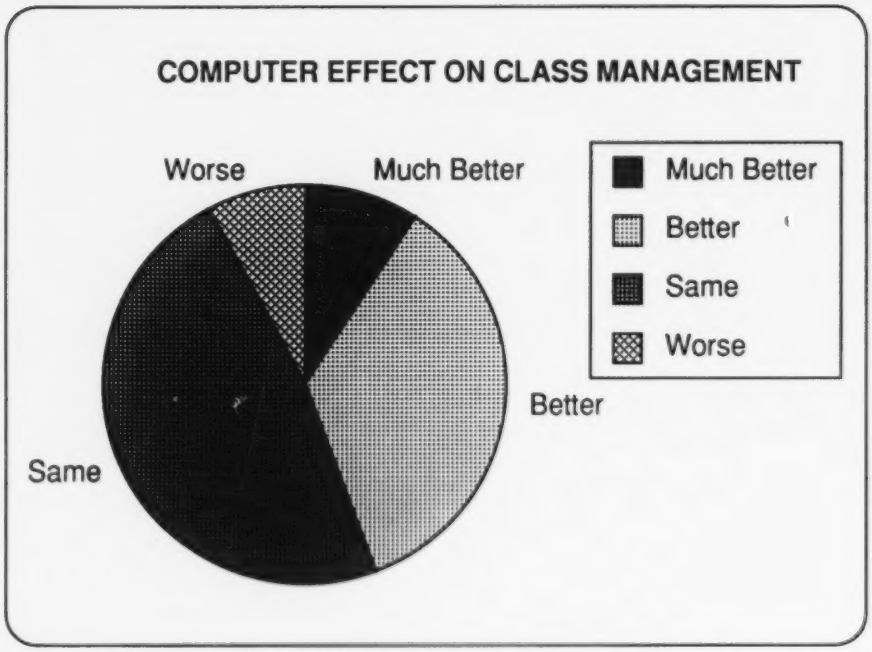
b) Student enjoyment while working

Graph 22



c) Classroom management

Graph 23



. . . less than half of these educators saw a positive effect of computers on classroom management.

While 67% and 79% of the responding department heads felt that student interaction with computer programs over time were found to positively effect student effort and student enjoyment while working on the computer, less than half of these educators saw a positive effect of computers on classroom management.

Since most classroom teaching is geared to the average student it is not surprising that department heads saw only a small benefit expected for average ability students while for the above average and below average students they would anticipate the largest gains.

Future of Computers in Instruction

What about the feelings of department heads on the effects of computers with respect to specific educational issues?

Table 14

DEPARTMENT HEADS SAW COMPUTERS IMPORTANT

a. As a tool for students to accomplish an academic task such as writing, analyzing data, or solving problems..26%

b. As a resource to enhance student's ability to learn 19%

c. As a good resource for the teacher to facilitate her/his instruction.....17%

d. As a method of improving student's basic skills 14%

e. As a tool for the teacher to accomplish administrative and instructional tasks 13%

f. As a good resource for students to learn more about computers 6%

g. As a tool to learn specific vocational skills 6%

Table 15

DEPT. HEADS SAW COMPUTERS IMPORTANT

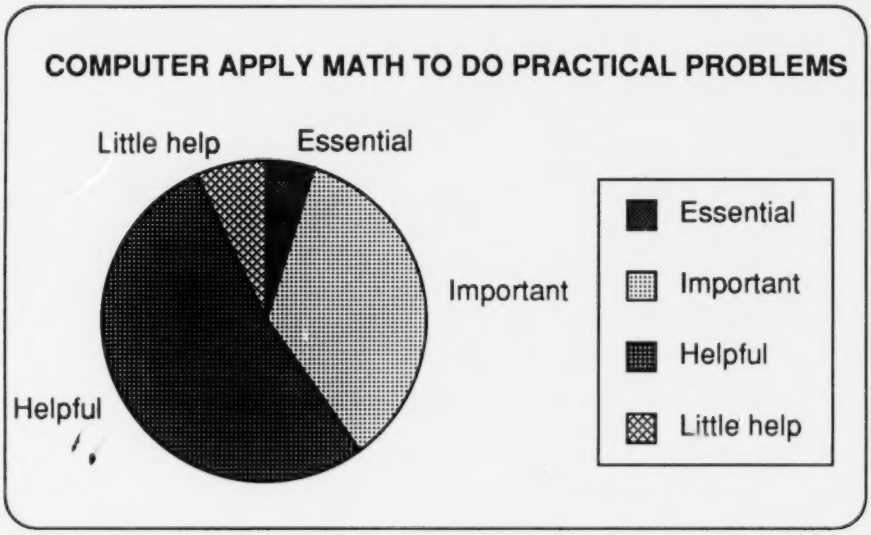
	a.	b.	c.	d.	e.	f.	g.
Art/Music	14%	24%	3%	24%	11%	22%	3%
Bus. Ed/Home Ec.	9%	5%	2%	16%	50%	18%	0%
Eng./Lang. Arts	28%	28%	3%	19%	16%	6%	0%
Foreign Lang.	6%	17%	8%	6%	42%	0%	22%
Health/PE	10%	23%	8%	20%	23%	17%	0%
Math	3%	10%	8%	13%	54%	10%	3%
Science	13%	18%	13%	20%	20%	18%	0%
Social Studies	10%	29%	5%	24%	22%	10%	0%
Special Ed.	38%	23%	2%	8%	10%	17%	2%
Vocational Ed.	12%	12%	5%	19%	14%	10%	29%

Looking at the future, department heads were presented with a question by which they were asked how important the use of computers would soon become for improving student mastery of the material. They were asked to judge whether computers would be either "essential," "important," "helpful," or of "little help" to the mastery of a list of traditional skills

presented to them. Their responses are summarized in the graphs below:

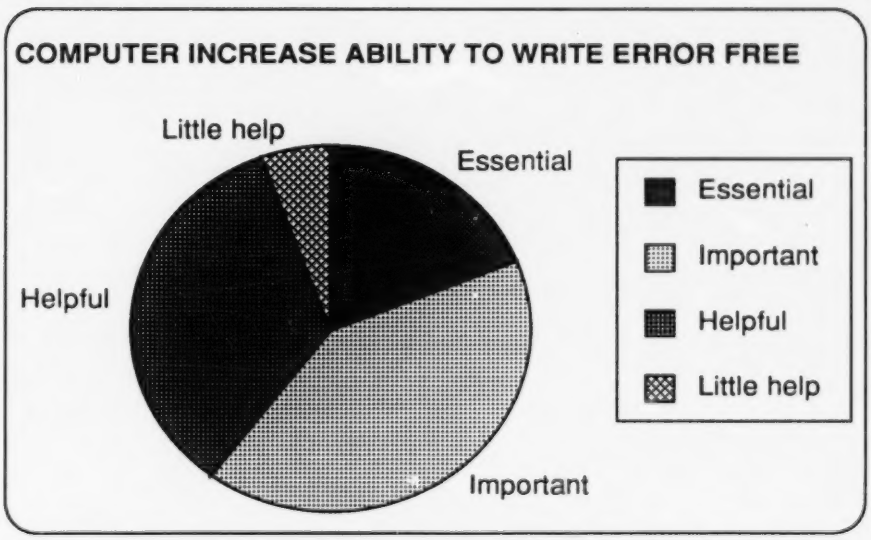
a) The ability to apply mathematics to solve practical problems . . .

Graph 24



b) The ability to write readable and "error free" essays and reports for your subject.

Graph 25



c) The ability to acquire new knowledge in your subject area . . .

. . . how important the use of computers would soon become for improving student mastery of the material.

Table 16

NEW KNOWLEDGE

	Essential	Important	Helpful	Little Help
OVERALL	7%	28%	51%	13%

d) Knowing facts about your subjects .... the use of computers will be ...

Table 17

SUBJECT FACTS

	Essential	Important	Helpful	Little Help
Art/Music	0%	28%	57%	14%
Bus. Ed/Home Ec.	15%	24%	56%	6%
English/Lang. Arts	0%	16%	51%	32%
Foreign Lang.	3%	30%	50%	13%
Health/PE	3%	32%	59%	6%
Math	0%	21%	55%	24%
Science	2%	24%	59%	15%
Social Studies	0%	24%	68%	9%
Special Ed.	0%	26%	73%	0%
Vocational Ed.	24%	32%	45%	3%
ON THE OVERALL	5%	26%	57%	12%

... the use of computers will become, if anything, helpful if not important in the overall development of abilities and students' learning.

As can be noted from the findings above, most department heads believe that the use of computers will become, if anything, helpful if not important in the overall development of abilities and students' learning.

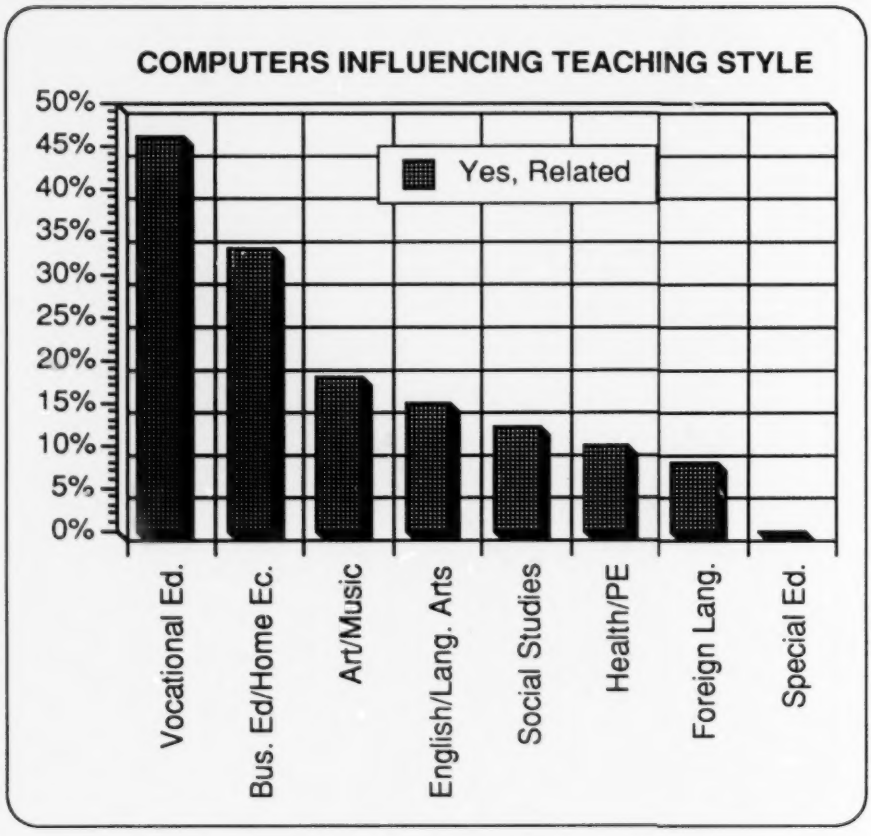
Looking at the subject of methodology or didactics, department heads were asked whether the use of computers had changed their customary ways of teaching their subject. In order to give them some guidelines as what the question specifically referred to, participants were given eight different topics related to pedagogical issues and asked to rate these according to a differential scale.

Their responses are not summarized in this document. But from 12%-19% saw significant changes in the eight areas because of computers. Those eight methodologies were: (1) one group used computers while teacher assisted another group;

(2) students working individually; (3) whole class activities; (4) communications with student's parents; (5) teaching toward specific goals; (6) tracking learning to see if goals are being met; (7) students helping other students; (8) teachers working more evenings and weekends in preparation.

Computers were related to greater teaching style changes in some subject areas than others.

Graph 26



. . . since they began using computers most of the examined issues have caused changes in their teaching.

As one can observe from the findings above, the majority of the department heads do concur that since they began using computers most of the examined issues have caused changes in their teaching. However, only 12-19% of the time were these changes perceived to be because of computers. The graph shows that some subject areas have been affected more than others.

. . . only 12-19% of the time were these changes perceived to be because of computers.

Current Practices in Classrooms

Next, when participants were asked whether the use of computers in class was to present students with activities apart

from regular instruction, part of the regular delivery of instruction or with activities designed to help students who are behind in their understanding or achievement, their choices could be displayed in the following table.

Table 18

HOW COMPUTERS ARE USED IN CLASSROOMS

Computers used in class for enrichment 40%

Computers used during regular instruction 43%

Computers used for remediation 17%

. . . department heads were given a set of concerns which might have been expressed in their school . . .

Sometimes there are more people who want to use a computer than can be accommodated—especially considering how many computers there are and how much supervision is available. Therefore, department heads were given a set of concerns which might have been expressed in their school or department by a teacher or a parent. The summary of these responses as well as the frequency of these concerns are presented in the following tables :

Table 19

a) From a parent: "My child isn't getting an opportunity to use a computer."

TIMES DEPARTMENT HEAD HEARD CONCERN

	None	1-2	3-5	6-10	11+
OVERALL AVERAGE	89%	6%	4%	0%	0%

Table 20

b) From a teacher: "My students can't get enough computer time."

	None	1-2	3-5	6-10	11+
OVERALL AVERAGE	56%	17%	14%	5%	8%

Table 21

c) From a teacher: "I can't get enough computer time for my own use."

	None	1-2	3-5	6-10	11+
OVERALL AVERAGE	53%	21%	13%	6%	7%

Table 22

d) Other major concerns about access to computers.

	None	1-2	3-5	6-10	11+
OVERALL AVERAGE	55%	15%	10%	8%	12%

As can be noted from the above findings, less than half of the department heads heard serious concerns relating to computer use. The most often heard comment was that the computer using teachers do feel that they and their students do not get enough computer time.

. . . less than half of the department heads heard serious concerns related to computer use.

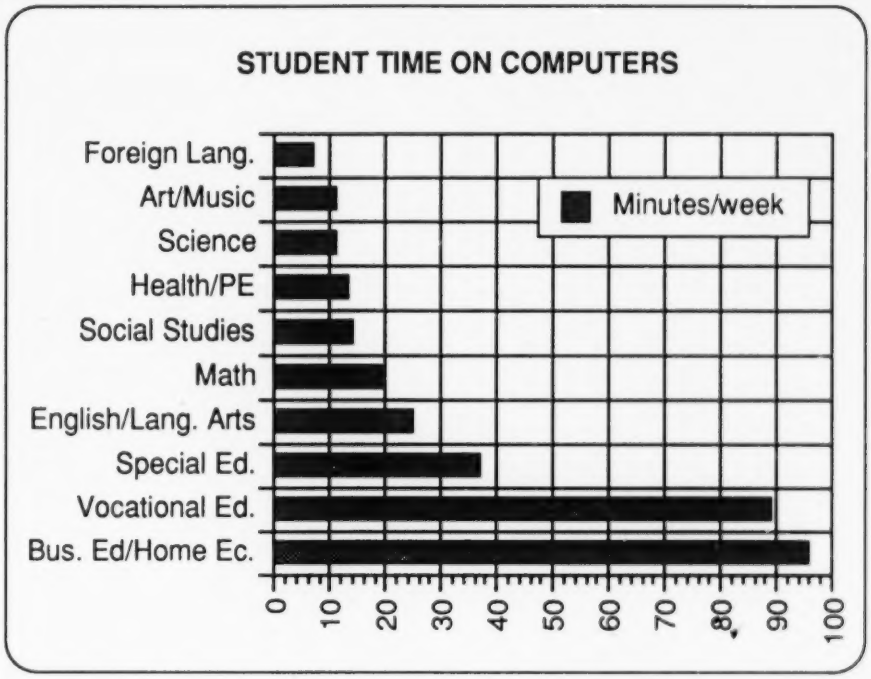
When students do get access to the computer, all students seem to use the computer for about the same amount of time, with the exception that higher achieving and slow-learning students seem to use it longer. Of interest here is the fact that when asked how many minutes during the average week a typical student spent at a computer, including time during class and time away from class, department heads responded as follows for the minutes per week of computer use for students in their department:

Table 23

MINUTES PER WEEK PER STUDENT

English/Language Art	25
Health/PE	13
Vocational Education	89
Art/Music	11
Special Education	37
Social Studies	14
Business Education/Home Economics.	96
Foreign Language	7
Mathematics	20
Science	11

Graph 27



One can notice that the average time per department differs significantly.

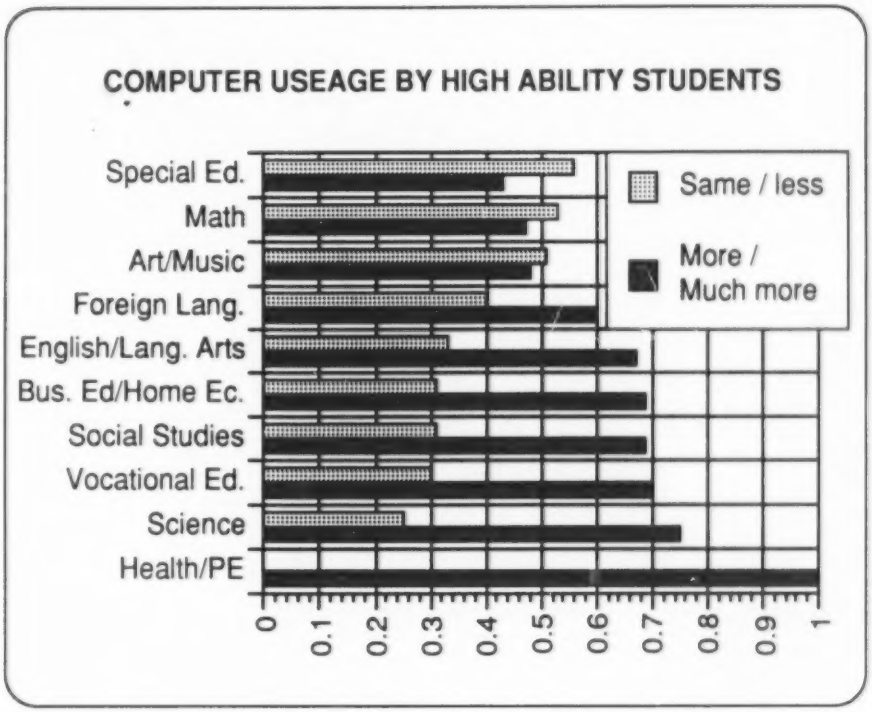
Now, when pooling all departments the data revealed that students access a computer on the average approximately 32 minutes during an average week. This might be reasonable for some while not enough for others. One can notice that the average time per department differs significantly. While the student in the department of business education/home economics averages about 96 minutes, the student in the department of foreign languages only accesses the computer on the average for approximately seven minutes!

Hence, in order to get some insight as to which students interact with the computer, participants were asked how the higher achieving student, the average student or the below average student compares as to their use of the computer. The responses to that inquiry are summarized in the following tables.

When the "higher achieving" student is compared to the "average" student, his/her...

a) Overall use of computers at school is . . .

Graph 28



Higher ability students use computers more except in special education, math and art/music.

Table 24

b) Use before or after school is . . .

	Much	More	Same	Less	N.A
OVERALL	16%	46%	12%	2%	23%

Table 25

c) Use for school assignments is . . .

	Much	More	Same	Less	N.A
OVERALL	19%	45%	16%	1%	19%

Table 26

d) Use in elective computer programming classes is . . .

	Much	More	Same	Less	N.A.
OVERALL	14%	34%	23%	1%	28%

Table 27

e) Use for playing computer games is . . .

	Much	More	Same	Less	N.A.
OVERALL	9%	22%	32%	7%	30%

On the other hand, when the "lower achieving" student is compared to the "average" student, his/her

a) Overall use of computers at school is . . .

Graph 29

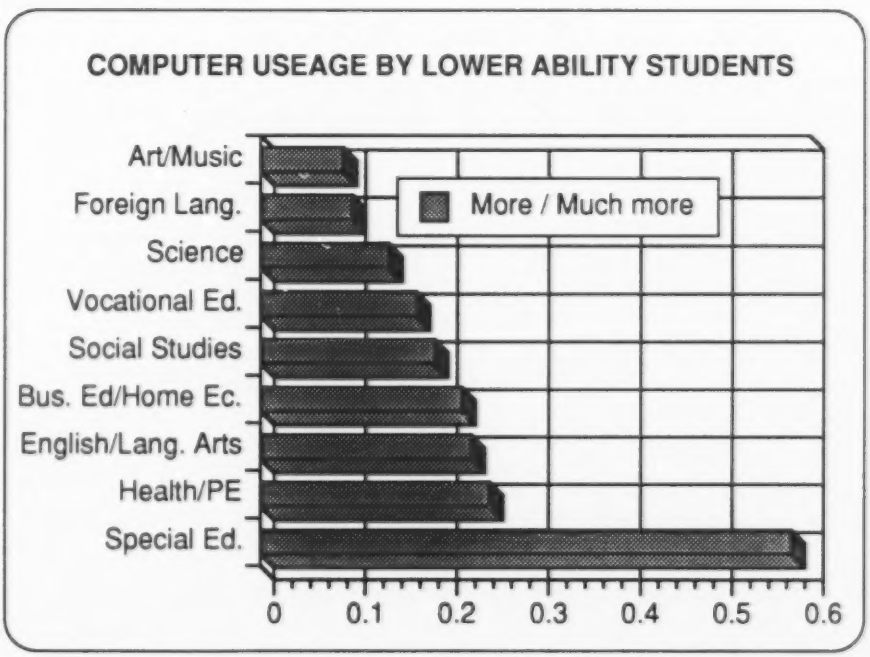


Table 28

b) Use before or after school is . . .

	Much	More	Same	Less	N.A.
OVERALL	4%	12%	22%	42%	21%

Table 29

c) Use for school assignments is . . .

	Much	More	Same	Less	N.A.
OVERALL	1%	16%	18%	47%	17%

Table 30

d) Use in elective computer programming classes is . . .

	Much	More	Same	Less	N.A.
OVERALL	5%	10%	25%	29%	32%

Table 31

e) Use for playing computer games is . . .

	Much	More	Same	Less	N.A.
OVERALL	11%	23%	31%	12%	24%

. . .the high achieving students use the computer more... except maybe for the playing of computer games.

In analyzing the findings above, it is noted that the high achieving students use the computer more, if not much more, on the overall than average students, except maybe for the playing of computer games. Slow learners use the computer on the overall less than average students, except when it comes to playing games. In that instance, slow learners seem to use the computer more than average counterpart.

Looking at the administrative tasks the computer could accomplish, participants were given seven different functions for

. . . the slow learner uses the computer on the overall less than the average student, except when it comes to playing games.

which computer equipment could be used and asked to state whether or not they accomplished any one of these functions with the computer. Their OVERALL responses are summarized in this table.

Table 32

Department heads use computers for . . .

Office word processing	54%
Student grades or report cards	53%
Library circulation or inventory	35%
Class scheduling or assignment of students	33%
Accounting for school expenditures or receipts	32%
Required records or reports, such as IEPs	30%
Student attendance recordkeeping	28%

. . . the majority of administrative functions revolve around office grades and word processing.

As one can note, the majority of administrative functions revolve around student grades and word processing.

Computers in many instances are used to either enhance regular teaching or remediate the deficiencies students acquire in their learning of secondary school subject matter. In order to get some insight into how the computer might be used when students have trouble understanding the material offered in a specific department, department heads were asked to respond to a variety of concerns related to this issue. The tables below summarize the overall responses by all these participants as well as the responses of the department heads in each department.

Table 33

When students have trouble understanding the material offered . . .

We give them extra personal instruction during seatwork time	50%
We have a higher-achieving student give them help	25%
We have an aide or resource teacher work with them	13%
We give them easier material to practice on	11%
We give them extra time on the computer	9%
Other	15%
It's not a problem in this class	4%

Hence, on the overall, when students have problems understanding subject matter, assistance was given in the form of extra time on the computer to only 9% of the students.

Looking then at this particular solution in light of the responses provided by each department, the following summary table of responses could be displayed.

. . . when students have problems understanding subject matter, assistance was given as extra time on the computer to only 9% of the students.

Table 34

SOLUTION: GIVE EXTRA TIME ON THE COMPUTER FOR HELP

Mathematics	19%
Business Education/Home Economics	19%
Vocational Education	11%
Foreign Language	10%
Art/Music	9%
Special Education	5%
Social Studies	4%
English/Language Art	3%
Health/PE	0%

Now, as a follow-up to the previous question, department heads were asked how they dealt with students who could learn at a more rapid rate. The summary of their overall responses to that question is displayed in the following table.

Table 35

SOLUTION FOR FASTER STUDENTS

Enrichment activities, not on a computer	36%
They continue in their regular work at own pace	20%
Not a problem	16%
Enrichment problems on the computer	14%
Help other students	12%
Other	3%

Whereas on the overall, 36% of the participants give enrichment activities on the computer, departments individually differ significantly in the way they handle these types of students. Therefore, what follows is the way each individual department takes care of the problem with the help of the computer.

Table 36

COMPUTER ENRICHMENT FOR FASTER STUDENTS BY DEPARTMENT

Special Education	30%
Business Education/Home Economics	27%
Vocational Education	24%
Mathematics	18%
Art/Music	13%
Foreign Language	11%
English/Language Art	9%
Social Studies	8%
Science	3%
Health/PE	0%

It is interesting to observe that of all the departments responding to the question, the departments of Special Education, Business Educ/Home Economics, and Vocational Education have significant use of the computer as a resource for these kinds of students. The traditional subjects do not seem to do so as significantly.

Analyzing the table above, it is interesting to observe that of all the departments responding to the question, the departments of Special Education, Business Educ/Home Economics, and Vocational Education have significant use of the computer as a resource for these kinds of students. The traditional subjects do not seem to do so as significantly.

As computers are used to generate all kinds of programs, it was thought to be of value to find out what kind of programs are used by what percent of all students. Therefore, department heads were presented with a variety of types of activities with which students might interact. Then they were asked to state what percent of their student body interacted with these kinds of programs for the school year. A summary of their responses is found in Table 37 which follows.

Table 37

TYPE OF STUDENT USE

Using word processors or text editors	21%
Drill-and-practice or tutorial	15%
Computer-assisted instruction	13%
Doing other discovery learning or problem-solving activities	11%
Using simulation activities	7%
Using data base or spreadsheet related activities	5%
Independent research	4%
Writing computer programs	3%

As one can notice, while students use the computer for a variety of reasons, word processing tasks as well as drill-and-practice and tutorials are still the main programs with which they interact.

As a follow-up to this question then, participants were asked, given a set of program types, to indicate which one of these programs had been used and, which one of these programs had been the one used most often. The responses to this question are now summarized in the tables below:

Table 38

PROGRAM TYPES USED IN CLASSROOMS	Used	Most Used
Word processing software/help writing	38%	27%
Simulations for learning or using concepts/skills	37%	12%
Games help student practice words/skills/concepts	35%	11%
Problem-solving programs/discovery learning tasks	34%	14%
Drills to help students practice vocabulary/skills	32%	12%
Programs that tutor concepts/methods	31%	5%
Programs to make pictures/graphics/music	28%	10%
Programs that calculate/help solve math problems	25%	5%
Other uses of computers	14%	6%
A programming language to write own programs	10%	1%

Again, as can be seen, word processing as well as the three most popular computer-assisted learning programs are the most popular program, although word processing programs are the most often reused programs by secondary school students.

When students use these programs, they access the computer usually in the following manners:

Table 39

COMPUTER WORKING MODE

One student per computer working alone	(45%)
One student per computer/other students watch/help	(21%)
A pair of students per computer	(22%)
More than two students per computer	(12%)

Department heads were also asked, when students access the computer how many minutes long, on the average, is a "turn" for each student (or group of students) at the computer. Their responses are found in Table 40.

Table 40

LENGTH OF COMPUTER TIME PER STUDENT

Department	Average Number of Minutes
Business Education/Home Economics	36
Mathematics	36
Vocational Education	28
Foreign Language	23
Special Education	20
Science	18
English/Language Art	16
Art/Music	12
Social Studies	11
Health/PE	4

The time spent once at the computer differs significantly from one department to another with the overall access time once at the computer at about 20 minutes per student.

The time spent once at the computer differs significantly from one department to another with the overall access time once at the computer at about 20 minutes per student.

As most educators will agree today, there are still quite a few people who express reservations about the school buying and using microcomputers for instruction. Therefore, this survey wanted to present to its participants a list of common concerns that they might have heard either in a staff lounge, a cafeteria

or hallway of their school and which reflects on this issue. They were asked to indicate the two most often heard reservations among those presented. The summary of their responses are displayed in Table 41.

Table 41

COMPUTER CONCERNS

The school has too few computers for students to get enough time to learn	35%
I have not heard any reservations about computers at this school	19%
There is not enough time to fit computers in	16%
The computer programs cost too much in the quantity we need	16%
There are better ways to provide instruction than using computers	8%
Teaching programming is not that important for children of this age	6%
Other reservations you have heard	5%

(describe): _____

. . . the two most often heard reservations . . .

The overall average of the responses indicated that the most often heard concern related to the fact that the school had too few computers for students to get enough time to educationally benefit from their interaction with a program. However, the variability between responses from each different department within and between schools was insignificant. In other words, the majority of department heads between and within school departments provided the same response.

Top Problems to Solve

To conclude the survey, department heads were asked if their department could solve only three of a given set of problems, which of the problem's solutions would in their opinion most improve their department's use of computers for instruction. A summary of their final responses is described in Table 42.

Table 42

TOP PROBLEMS

Not enough computers to go around	38%
Too costly to buy enough copies of software to go around	19%
No time to develop lesson plans to integrate software with the curriculum	18%
Teachers do not have enough knowledge or training	17%
No time to develop enough useful computer-based activities	17%
Hard to locate or evaluate the software that has been written	12%
Software not yet written for many topics that must be taught	11%
Not enough money to train teachers about computers	11%
Teachers lack interest in learning about computers	7%
Poor quality of instructional software	7%